

STSE 2026 · SAMPLE CASE STUDIES

Science Talent Search Examination

Science from the news and the world around us

Physics

Chemistry

Biology

Earth & Space



Infinity Masterclasses

Vasundhara, Ghaziabad
Built around your child.



What is inside

CLASS 5–6

Which Way Is Down?

BIOLOGY · SPACE SCIENCE

How a root knows where "down" is, and what happened to seeds an Indian astronaut sprouted in space.

New idea: plants sense gravity with tiny settling grains.

CLASS 7–8

The Invisible Lid

ENVIRONMENT · PHYSICS

Why Ghaziabad's air turns grey every November, and why weather matters as much as smoke.

New idea: temperature inversion and the AQI scale.

CLASS 9–10

The Heat You Can't Sweat Off

BIOLOGY · PHYSICS

Why a humid 38 °C day can be more dangerous than a dry 48 °C one.

New idea: wet-bulb temperature and the energy in sweat.

Why STSE?

Science is not a list of definitions to memorise. It is a way of asking questions about the world and checking the answers against evidence. STSE brings that to life through case studies drawn from the news and from a child's own surroundings: seeds sprouting in space, the smog over our city, the summer heat.

Each case study teaches one new idea, with the data or diagram needed to use it, then asks questions that reward careful reading and clear thinking. A student who has never met the topic can still solve it. STSE celebrates curious minds who reason like scientists, not just recall.

STSE 2026 at a glance

December 2026

Academic session 2026–27

Class 5 to 10

Three class groups: 5–6, 7–8, 9–10

2 hours

40 questions, 200 marks

No negative marking

Every question is MCQ

Science from life

Physics, chemistry, biology, earth and environment

Case-study based

Learn it in the paper, then apply it

Try it yourself: pick your class group, read the case study, answer the five questions, then check your answers on the back page.

CASE STUDY 1

Which Way Is Down?

BIOLOGY · SPACE SCIENCE



QUESTIONS

1-5

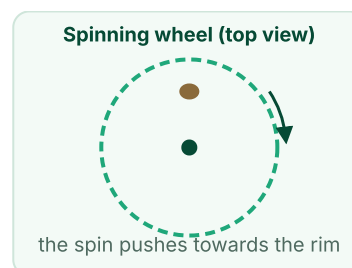
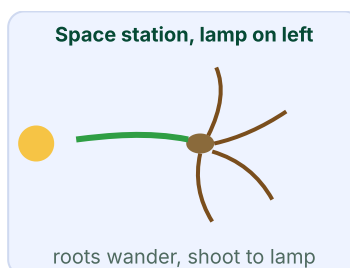
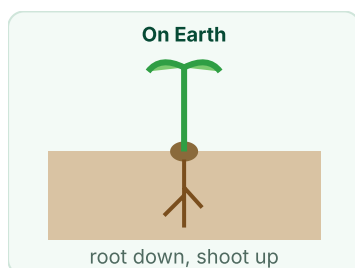
5 × 5 = 25 marks

IN THE NEWS In July 2025, Indian astronaut Shubhanshu Shukla sprouted moong and methi seeds on the International Space Station, about 400 km above the Earth.

Plant a seed any way up, and its root still grows down while its shoot grows up. How does a root, with no eyes, know which way is down? And what happens in space, where nothing falls and there is no "down" at all?

The key ideas

- Near the tip of every root are cells holding tiny heavy grains. Like sand in a bottle of water, the grains **settle** on the side of the cell that is being pulled. The root grows towards the side where the grains settle. This is how it finds "down".
- Shoots grow the **opposite** way to roots. Shoots also bend **towards light**. The roots of these seedlings ignore light.
- On the space station, everything floats. The grains do not settle anywhere, so the root gets no "down" signal.
- Scientists can make a pretend "down" by spinning seedlings slowly in a wheel. The spin pushes everything towards the rim, just as you feel pushed outward on a merry-go-round. **Even a gentle push**, much weaker than the Earth's pull, makes the grains settle.



Seedlings on Earth, on the space station, and in a spinning wheel. In the third panel the growth is left for you to predict.

Four set-ups, five days of growth

Set-up	Where	Light	Roots grew	Shoots grew
P	Earth, pot upright	from above	down	up
Q	Earth, pot tipped on its side	from above	bent to grow down	bent to grow up
R	Space station	lamp on the left	in every direction	towards the lamp
S	Space station	dark box	in every direction	in every direction

Questions

- 1 On Earth, Kavya plants a moong seed in a dark cupboard. When the root first pokes out, it is pointing straight **up**. What will the root do next?
 - A. Keep growing up, because that is the way it started
 - B. Curve round and grow down
 - C. Grow in every direction, because there is no light
 - D. Stop growing, because it is upside down
- 2 In set-up R, the shoots all grew one way but the roots grew every way. Why?
 - A. Roots grow faster in space, so they get tangled.
 - B. The seeds were planted the wrong way up.
 - C. The lamp pulls on the shoots, like a magnet.
 - D. Shoots can follow the light, but roots follow only "down", and the station gives no "down" signal.
- 3 Which two set-ups show that, in space, it was the lamp that made the shoots grow in one direction?

A. P and Q	B. P and R
C. R and S	D. Q and S
- 4 On the space station, seeds are fixed near the rim of the slowly spinning wheel, inside a dark box. Which way will the roots and shoots grow?
 - A. Roots towards the rim, shoots towards the centre
 - B. Roots towards the centre, shoots towards the rim
 - C. Both in every direction, because the spin is too gentle
 - D. Both towards the rim
- 5 The Moon pulls things down about one-sixth as strongly as the Earth. A seed sprouts on the Moon inside a dark box. Its root will most likely grow
 - A. in every direction, because the Moon's pull is too weak to notice.
 - B. down, towards the Moon's ground.
 - C. up, away from the Moon's ground.
 - D. towards the nearest light.

CASE STUDY 1

The Invisible Lid

ENVIRONMENT · PHYSICS



QUESTIONS

1-5

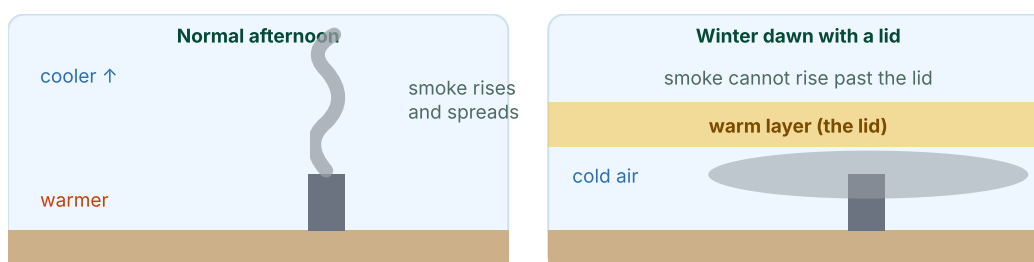
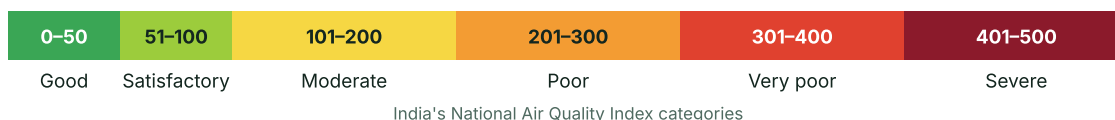
5 × 5 = 25 marks

AROUND US Every November, Ghaziabad and Delhi wake up to grey skies, and Ghaziabad is often listed among the most polluted cities in India.

Smoke and dust come from vehicles, factories, construction sites and crop stubble burnt in fields hundreds of kilometres away. But the amount of smoke is only half the story. The weather decides whether that smoke escapes or stays trapped right where we breathe.

The key ideas

- **PM2.5** means particles smaller than 2.5 micrometres (μm) across. One micrometre is one-thousandth of a millimetre. A human hair is about 70 μm thick. PM2.5 is small enough to slip deep into the lungs.
- The **Air Quality Index (AQI)** turns pollution into one number. India's scale is shown below.
- Normally, the air gets **cooler as you go higher**. Warm air near the ground rises, carrying smoke up and away.
- On calm, clear winter nights, the ground loses heat fast and chills the air touching it. By dawn, a layer of cold air lies **under** a layer of warmer air. Cold air is heavier, so it cannot rise through the warm layer. The warm layer works like a **lid**, and smoke stays trapped near the ground. This is a **temperature inversion**.
- When the Sun warms the ground later in the day, the lid breaks and the air can mix upward. Wind also carries smoke away sideways.



One week in Ghaziabad, November

Day	Wind (km/h)	Lid at dawn?	Farm fires seen by satellite	AQI at 8 am	AQI at 4 pm
Mon	3	Yes	1200	420	310
Tue	4	Yes	400	390	290
Wed	14	No	1300	180	140
Thu	12	No	300	160	120
Fri	3	Yes	350	400	300

Questions

- 1 About how many PM_{2.5} particles, each 2.5 μm across, would fit side by side across the thickness of one human hair?

A. 3
C. 70

B. 28
D. 175
- 2 Every day of the week, the 4 pm AQI was lower than the 8 am AQI. Which explanation does the case study support?

A. There are fewer vehicles on the road in the afternoon.

B. Farmers burn stubble only in the morning.

C. The Sun warms the ground, the lid breaks, and the smoky air mixes upward.

D. The afternoon heat makes the PM_{2.5} particles evaporate.
- 3 Which pair of days shows that a day with **more** farm fires can still have **cleaner** morning air in Ghaziabad?

A. Mon and Tue
C. Mon and Fri

B. Wed and Thu
D. Wed and Fri
- 4 The forecast for next Monday: wind 4 km/h, a lid at dawn, and only 200 farm fires. What is the most likely AQI category at 8 am?

A. Very poor or worse
C. Satisfactory

B. Moderate
D. Poor
- 5 At 7 am, a weather balloon measures the air temperature at three heights. Which set of readings shows a lid?

	Ground	200 m up	500 m up
A	15 °C	14 °C	12 °C
B	9 °C	13 °C	11 °C
C	20 °C	18 °C	16 °C
D	6 °C	4 °C	1 °C

SECTION A · CASE STUDY

The Heat You Can't Sweat Off

BIOLOGY · PHYSICS

QUESTIONS

1–5

5 × 5 = 25 marks

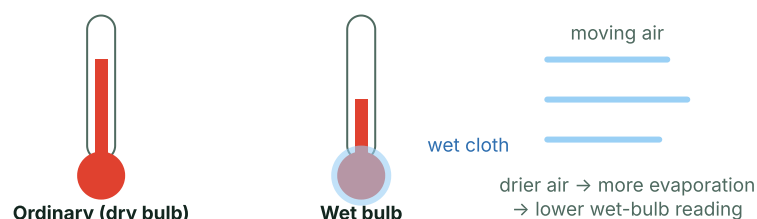


IN THE NEWS Heatwaves across India are getting longer and more frequent, and parts of north India have recorded temperatures close to 50 °C.

Doctors warn that a humid 38 °C day in Kolkata can be more dangerous than a dry 48 °C day in the Thar desert. That sounds wrong. A higher temperature should be worse. The answer lies in how your body gets rid of heat.

The key ideas

- Your body makes heat all the time: about **100 W** at rest, and **400 W** or more during hard physical work. To keep your core at 37 °C, this heat must leave the body.
- On a hot day the main way out is sweat. When **1 g of sweat evaporates**, it takes about **2400 J** of heat from the skin. Sweat that drips off without evaporating takes away almost no heat.
- Water evaporates quickly into dry air and slowly into humid air.
- A **wet-bulb thermometer** has its bulb wrapped in a wet cloth, with air blowing over it. Evaporation cools it, so it reads lower than an ordinary thermometer. The drier the air, the bigger the drop. It can never read **higher** than an ordinary thermometer, and in air that is completely full of moisture (100% humidity) the two read the same.
- The wet-bulb temperature is about the **lowest temperature that evaporation can cool anything to**: wet skin, or the air coming out of a desert cooler.
- Heat flows out of the body only if the skin stays cooler than the core. Scientists once put the human limit at a wet-bulb temperature of 35 °C. Experiments in 2022 on healthy young volunteers found their bodies began to overheat at a wet-bulb of about **31 °C**.



Four hot days

Place and month	Air temperature	Humidity	Wet-bulb temperature
Phalodi, Rajasthan · May	48 °C	10%	23.1 °C
Delhi · June	44 °C	30%	28.9 °C
Kolkata · June	38 °C	65%	32.1 °C
Mumbai · September	33 °C	90%	31.6 °C

Questions

- 1 On which of the four days was it hardest for a person's body to cool itself?
A. Phalodi
B. Delhi
C. Mumbai
D. Kolkata
- 2 A family in Delhi runs a desert cooler, which blows air through wet pads. On the June day in the table, what is the lowest temperature the cooler could possibly bring the air down to?
A. About 15 °C
B. About 29 °C
C. About 37 °C
D. About 44 °C
- 3 A student records four pairs of readings (ordinary thermometer, wet-bulb thermometer). Which pair must contain a mistake?
A. 30 °C, 30 °C
B. 40 °C, 26 °C
C. 35 °C, 38 °C
D. 25 °C, 20 °C
- 4 A construction worker doing hard work produces 400 W of body heat. How much sweat must **evaporate** each hour to carry all of this heat away?
A. 0.17 g
B. 167 g
C. 1440 g
D. 600 g
- 5 The same worker (400 W) is in Kolkata on the June day. He sweats 1000 g in an hour, but because the air is humid only 300 g evaporates; the rest drips off. What happens?
A. About 200 J of extra heat stays in his body every second.
B. About 133 J of extra heat stays in his body every second.
C. He loses heat faster than he makes it, so he cools down.
D. He is safe, because 1000 g is more than the 600 g he needs.

Check your answers

Each correct answer earns 5 marks, so each case study is worth 25 marks. The full paper has 40 questions for 200 marks. There is no negative marking.

Class group	Q1	Q2	Q3	Q4	Q5
Class 5–6 · Which Way Is Down?	B	D	C	A	B
Class 7–8 · The Invisible Lid	B	C	D	A	B
Class 9–10 · The Heat You Can't Sweat Off	D	B	C	D	A

What these case studies reward

- **Reading closely:** every answer comes from the passage, the table or the diagram, not from memory.
- **Telling cause from coincidence:** was the air dirty because of the farm fires, or because there was no wind?
- **Reading data with care:** growth tables, AQI readings and wet-bulb temperatures all hide the answer in the numbers.
- **Thinking beyond the textbook:** from how a root finds "down" to why sweat stops working in humid heat.

The tables in these case studies use simplified data for learning.

Think it through at STSE 2026

The Science Talent Search Examination, for Class 5 to Class 10. Students can register directly with Infinity Masterclasses.



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